UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
OSB1999-0239

September 20, 1999

Ms. Karen Kochenbach
Corps of Engineers
Portland District
P.O. Box 2946
Portland, OR 97208-2946

Re: ESA Section 7 Formal Consultation on the City of Portland's Willamette River Eastbank Riverfront Bank Improvements and Fire Boat Dock Project (Army Corps of Engineers Permit Application ID No: 99-501)

Dear Ms. Kochenbach:

This letter represents the National Marine Fisheries Service's (NMFS) Biological Opinion, pursuant to Section 7(a)(2) of the Endangered Species Act (ESA), that the effects of the City of Portland's Willamette River Eastbank Riverfront Bank Improvements and Fire Boat Dock Project, together with cumulative effects and the effects of the environmental baseline, are not likely to jeopardize the continued existence of certain listed, proposed and candidate fish species. This letter also authorizes incidental take associated with the subject activities.

Background

On August 6, 1999, the U.S. Army Corps of Engineers (COE) sent a letter to Rick Applegate, NMFS, requesting formal consultation for the City of Portland's Willamette River Eastbank Riverfront Bank Improvements and Fire Boat Dock Project. Prior to this date, there were numerous pre-application meetings with the City of Portland and the resource agencies. Enclosed in the August 6, 1999, letter was a Biological Assessment (BA) prepared by Beak Consultants Inc.

The specific listed and proposed Evolutionarily Significant Units[1] (ESU) and candidate species considered in this Biological/Conference Opinion are:

ESUs Listed as Threatened:

Lower Columbia River (LCR) steelhead *(Oncorhynchus mykiss)*
Lower Columbia River (LCR) chinook salmon *(O. tshawytscha)*
Upper Willamette River (UWR) steelhead *(O. mykiss)*
Upper Willamette River (UWR) chinook salmon *(O. tshawytscha)*

ESU Proposed as Threatened:

Southwestern Washington/Columbia River (SW/CR) sea-run cutthroat trout (*O. clarki clarki*)

ESU Candidate Species:

Southwest Washington/Lower Columbia River (SW/LCR) coho salmon *(O. kisutch)*

Proposed Action

The project area is on the east bank of the Willamette River within the City of Portland, Multnomah County, Oregon. Interstate 5 bounds the project on the east, and the south end of the project extends to the south side of the Hawthorne Bridge. The north end of the project extends to the Morrison Bridge and the south end of Phase I[2]. The existing bank in the project area is steep, with approximately a 1.5:1 to 2:1 slope, and is covered in large riprap and concrete fill. The Greenway Trail runs along the top of the project area, and consists of a paved walk with some vegetation and ornamental plantings. Vegetation is generally absent from this riprapped area, except for several small and large trees near the Hawthorne Bridge. Several 177 mm (7 in) combined sewer overflow outfalls emerge from the bank.

The purpose of this project is to provide public water access and a permanent moorage for the Portland Fire Bureau's vessel, the David Campbell, and to provide improvements to the existing riverbank. The main dock will be 12-ft wide by approximately 525-ft long. A 20-ft by 20-ft dock will provide a landing area for two gangways. An aluminum gangway 90-ft by 6-ft wide with a grated deck will provide access to the dock. A parallel gangway similar in size, equipped with an inclined lift will provide access to the dock to comply with the American's with Disabilities Act, if required by local authorities. Grating will be placed along the entire length of the dock to provide for light penetration; the grating consists of 2-ft long panels, the width of the dock, spaced at 4-ft intervals, equaling 25% of

[1] For the purposes of conservation under the Endangered Species Act, an Evolutionarily Significant Unit (ESU) is a distinct population segment that is substantially reproductively isolated from other conspecific population units and represents an important component in the evolutionary legacy of the species (Waples, 1991).

[2] Phase 1 went through ESA informal consultation, which was concluded by an October 1, 1998 concurrence letter from NMFS to the COE.

the total dock surface area. A total of (60) 24" diameter steel piles will be used to anchor the boathouse and the dock system. Predatory bird prevention devices (cones) will be placed on the top of each pile (pers. comm., Tim Fisher, Beak Consultants Inc., August 26, 1999.)

The dock and boathouse will be constructed on concrete encapsulated foam floats. The structure will be steel-framed with low maintenance materials. Extensive use of clear or translucent panels in both the roof and walls of the boathouse will provide significant light penetration to the water and will reduce concerns of shading as well as provide viewing of the historic vessel.

Bank improvements will consist of stabilization and bioengineering techniques applied to an urban river. The lowest impact improvements will consist of planting the existing riprap with native willows and red-osier dogwood cuttings. The next level of improvements will consist of removal of existing riprap below the ordinary high water elevation and replacement with a bioengineered bank, underlain by a rock base.

The slope will be terraced back using basalt stones, replicating existing riverbanks upstream. The terraces will vary, not exceeding a 3:1 slope, and in some areas creating flat areas for improved salmonid habitat. Large woody debris, downed trees with extensive root wads, will be invisibly anchored in the lower regions of the newly constructed bank.

In order for the bank to be laid back to allow for more riparian planting, a wall will be constructed to retain the upland improvements. The base of the wall will be planted with native vegetation; only limited areas of the wall will be visible upon completion. The upland improvements will also include a variety of native trees and shrubs, especially ash, cottonwood, red alder, and conifer trees for migratory wildlife. Additional wildlife trees (dead tree snags) will be erected on the bank to provide raptor roosting habitat. All in-water work will be conducted during the Oregon Department of Fish and Wildlife's in-water work period which is from July 1st to October 31st and December 1st to January 31st.

Biological Information and Critical Habitat

A list of all the listed and proposed species and their associated critical habitat information that are covered in this consultation is provided in Table 1. References for additional background on biological information and historical population trends are also provided.

Table 1. References for additional background on listing status, biological information, and critical habitat elements for the listed and proposed species addressed in this consultation.

Species	Listing Status		Critical habitat	Biological Information, Historical Population Trends
	Proposed Rule	Final Rule		
Lower Columbia River Steelhead		March 19, 1998; 63 FR 13347	February 5, 1999; 64 FR 5740 (PROPOSED RULE)	Busby *et al*. 1995; Busby *et al*. 1996
Lower Columbia River Chinook Salmon		March 24, 1999; 64 FR 14308	March 9, 1998; 63 FR 11482 (PROPOSED RULE)	Myers *et al*.1998; Healey 1991
Upper Willamette River Steelhead		March 25, 1999; 64 FR 14517	February 5, 1999; 64 FR 5740 (PROPOSED RULE)	Busby *et al*. 1995; Busby *et al*. 1996
Upper Willamette River Chinook Salmon		March 24, 1999; 64 FR 14308	March 9, 1998; 63 FR 11482 (PROPOSED RULE)	Myers *et al*.1998; Healey 1991
Southwestern Washington/ Columbia River Coastal Cutthroat Trout	April 5, 1999; 64 FR 16397		N/A	Johnson *et al*.1999; Trotter 1989

The action area is defined by NMFS regulations (50 CFR Part 402) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area includes designated critical habitat affected by the proposed action within the Willamette River in Portland at river mile 14. This area serves as a migratory corridor for both adult and juvenile life stages of all listed species under consideration in this BO. This area may also serve as a rearing area for juveniles. Essential features of the adult and juvenile migratory corridor for the species are: (1) Substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food (juvenile only), (8) riparian vegetation, (9) space, and (10) safe passage conditions (50 CFR Part 226). The essential features this proposed project may affect are water

quality, and riparian vegetation resulting from construction activities and safe passage conditions as a result of the structures placed in the river. **Evaluating Proposed Actions**

The standards for determining jeopardy are set forth in Section 7(a)(2) of the ESA as defined by its implementing regulations (50 CFR 402). When the NMFS issues a conference or biological opinion, it uses the best scientific and commercial data available to separately determine whether a proposed Federal action is likely to: (1) jeopardize the continued existence of a proposed, listed, or candidate species, and/or (2) destroy or adversely modify a proposed or listed species' critical habitat. This analysis involves the following steps: (A) define the biological requirements of the species; (B) evaluate the environmental baseline relative to the species' current status; (C) determine the effects of the proposed or continuing action on the species; (D) determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the environmental baseline and any cumulative effects, and considering measures for survival and recovery specific to other life stages; and (E) identify reasonable and prudent alternatives to a proposed or continuing action that is likely to jeopardize the continued existence of the species.

Furthermore, NMFS evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' critical habitat. The NMFS must determine whether habitat modifications appreciably diminish the value of critical habitat for both survival and recovery of the listed species. The NMFS identifies those effects of the action that impair the function of any essential element of critical habitat. The NMFS then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NMFS concludes that the action will adversely modify critical habitat it must identify any reasonable and prudent measures available.

For the proposed action, NMFS's jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NMFS's critical habitat analysis considers the extent to which the proposed action impairs the function of essential elements necessary for adult and juvenile migration and rearing of the listed salmon under the existing environmental baseline.

A. Biological Requirements

The first step in the method the NMFS uses in applying the ESA standards of Section 7(a)(2) to Pacific salmonids is to define the species' biological requirements that are most relevant to each consultation. The relevant biological requirements are those necessary for the listed and proposed species to survive and recover to a naturally reproducing population level at which protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance their capacity to adapt to various environmental conditions, and allow them to become self-sustaining in the natural environment.

The NMFS finds that these biological requirements are best expressed in terms of environmental factors that define properly functioning freshwater aquatic habitat necessary for the survival and recovery of the listed species. Individual environmental factors include water quality, habitat access, physical habitat elements, river channel condition, and hydrology. These are measurable variables, with properly functioning values estimated using the best available information as those necessary for sufficient prespawning survival and distribution, spawning success, egg-to-smolt survival, smolt emigration survival and timing, and smolt condition to allow the long-term survival of the species. Properly functioning watersheds, where all of the individual factors operate together to provide healthy aquatic ecosystems, are necessary for the survival and recovery of these species.

For this consultation, the most relevant biological requirements are: 1) improved habitat characteristics that function to support successful migration and rearing, and 2) unimpeded passage. The current status of the listed and proposed species, based upon their risk of extinction, has not significantly improved since the species was listed.

B. Environmental Baseline

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species or its habitat and ecosystem within the action area. The action area covered by this Opinion is the Willamette River between the Hawthorne and Morrison Bridges.

The biological requirements of the listed and proposed species are currently not being met under the environmental baseline. Their status is such that there must be a significant improvement in the environmental conditions they experience over those currently available under the environmental baseline. Any further degradation of these conditions would have a significant impact due to the amount of risk they presently face under the environmental baseline.

Analysis of Effects

A. Effects of Proposed Action

The mainstem Willamette River is an important migration route for numerous species of anadromous fish. Information from the Columbia River indicates that during migration, juvenile fall chinook salmon typically found in shallow, nearshore habitats (Dawley et al. 1986). Steelhead juveniles are normally found mid-river during migration (Dawley et al. 1986). Juvenile salmonid species such as spring chinook and coho salmon and up-river steelhead usually move downriver relatively quickly and in the main channel. This would aid in predator avoidance (Gray and Rondorf 1986). Fall and summer chinook salmon are found in nearshore, littoral habitats and are particularly vulnerable to predation (Gray and Rondorf 1986). Juvenile salmonids (chinook and coho salmon, and cutthroat trout) utilize

backwater areas during their outmigration (Parente and Smith 1981). In addition, the presence of predators may force smaller prey fish species into less desirable habitats, disrupting foraging behavior, resulting in less growth (Dunsmoor et al. 1991).

When a salmon stock suffers from low abundance, predation can contribute significantly to its extinction (Larkin 1979). Further, providing temporary respite from predation may contribute to increasing Pacific salmon (Larkin 1979). A substantial reduction in predators will generally result in an increase in prey (in this case, salmonids) abundance (Campbell 1979). Gray and Rondorf (1986), in evaluating predation in the Columbia River Basin, state: "The most effective management program may be to reduce the susceptibility of juvenile salmonids to predation by providing maximum protection during their downstream migration."

Over-water Structures

Predator species such as northern pikeminnow (*Ptychocheilus oregonensis*), and introduced predators such as largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), black crappie (*Pomoxis nigromaculatus*) white crappie (*P. annularis*) and, potentially, walleye (*Stizostedion vitreum*) (Ward et al. 1994, Poe et al. 1991, Beamesderfer and Rieman 1991, Rieman et al. 1991, Petersen et al. 1990, Pflug and Pauley 1984, and Collis et al. 1995) may utilize habitat created by over-water structures (Ward and Nigro 1992, Pflug and Pauley 1984) such as piers, float houses, floats and docks. However, the extent of increase in predation on salmonids in the lower Willamette River resulting from over-water structures is not well known.

Major habitat types utilized by largemouth bass include vegetated areas, open water and areas with cover such as docks and submerged trees (Mesing and Wicker 1986). During the summer, bass prefer pilings, rock formations, areas beneath moored boats, and alongside docks (Bill Monroe, *The Oregonian*, May 21, 1997). Colle et al. (1989) found that, in lakes lacking vegetation, largemouth bass distinctly preferred habitat associated with piers, a situation analogous to the Columbia River. Marinas also provide wintering habitat for largemouth bass out of mainstem current velocities (Raibley et al. 1997). Bevelhimer (1996), in studies on smallmouth bass, indicates that ambush cover and low light intensities create a predation advantage for predators and can also increase foraging efficiency. Wanjala et al. (1986) found that adult largemouth bass (*Micropterus salmoides*) in a lake were generally found near submerged structures suitable for ambush feeding.

Black crappie and white crappie are known to prey on juvenile salmonids (Ward et al. 1991). Ward et al. (1991), in their studies of crappies within the Willamette River, found that the highest density of crappies at their sampling sites occurred at a wharf supported by closely spaced pilings. They further indicated that suitable habitat for crappies includes pilings and riprap areas. Walters et al. (1991) also

found that crappie were attracted to in-water structures and recommended placement of structures as attractants in lake environs.

Ward (1992) found that stomachs of northern pikeminnow in developed areas of Portland Harbor contained 30% more salmonids than those in undeveloped areas, although undeveloped areas contained more northern pikeminnow.

There are four major predatory strategies utilized by piscivorous fish: they run down prey; ambush prey; habituate prey to a non-aggressive illusion; or stalk prey (Hobson 1979). Ambush predation is probably the most common strategy: predators lie-in-wait, then dart out at the prey in an explosive rush (Gerking 1994). Predators may use sheltered areas that provide slack water to ambush prey fish in faster currents (Bell 1991).

Light plays an important role in defense from predation. Prey species are better able to see predators under high light intensity, thus providing the prey species with an advantage (Hobson 1979). Petersen and Gadomski (1994) found that predator success was higher at lower light intensities. Prey fish lose their ability to school at low light intensities, making them vulnerable to predation (Petersen and Gadomski 1994). Howick and O'Brien (1983) found that in high light intensities prey species (bluegill) can locate largemouth bass before they are seen by the bass. However, in low light intensities, the bass can locate the prey before they are seen. Walters et al. (1991) indicate that high light intensities may result in increased use of shade-producing structures.

The effect of over-water structures is the creation of a light/dark interface that allows ambush predators to remain in a darkened area (barely visible to prey) and watch for prey to swim by against a bright background (high visibility). Prey species moving around the structure are unable to see predators in the dark area under the structure and are more susceptible to predation.

The incorporation of grating into the dock and translucent panels into the boathouse allows for more light penetration and diffuses the light/dark interface. This will minimize the susceptibility of juvenile salmonids to piscivorous predation resulting from this project.

In addition to piscivorous predation, in-water structures (tops of pilings) also provide perching platforms for avian predators such as double-crested cormorants (*Phalacrocorax auritis*), from which they can launch feeding forays or dry plumage. Their high energy demands associated with flying and swimming create a need for voracious predation on live prey (Ainley 1984). Cormorants are underwater pursuit swimmers (Harrison 1983) that typically feed on mid-water schooling fish (Ainley

1984), but they are known to be highly opportunistic feeders (Derby and Lovvorn 1997; Blackwell et al. 1997; Duffy 1995. Double-crested cormorants are known to fish cooperatively in shallow water areas, herding fish before them (Ainley 1984). Krohn et al. (1995) indicate that cormorants can reduce fish populations in forage areas, thus possibly affecting adult returns as a result of smolt consumption. Because their plumage becomes wet when diving, cormorants spend considerable time drying out feathers (Harrison 1983) on pilings and other structures near feeding grounds (Harrison 1984). The piles proposed to support the dock structures will potentially provide for some usage by cormorants. Placement of anti-perching devices on the top of the pilings would preclude their use by any potential avian predators.

Riparian Alteration

Riparian habitats are one of the most ecologically productive and diverse terrestrial environments (Kondolf et al. 1996, Naiman et al. 1993). Vegetation in riparian areas influences channel processes through stabilizing bank lines, and providing large woody debris, terrestrial food sources rather than autochthonous food production, and regulating light and temperature regimes (Kondolf et al. 1996, Naiman et al. 1993).

The riparian area in the vicinity of the proposed project has been substantially altered by prior activities. The proposed riparian project will improve habitat conditions for salmonids by increasing habitat complexity. Habitat complexity will be increased with the placement of large woody debris and the planting of native vegetation.

B. Critical Habitat

As described in previous sections of this Opinion, the City of Portland's Willamette River Eastbank Riverfront Bank Improvements and Fire Boat Dock Project may affect essential features of the proposed critical habitat of LCR steelhead, LCR chinook salmon, UWR steelhead, and UWR chinook salmon. The dock may provide habitat for predaceous fish, thereby inhibiting safe passage for juvenile salmonids. The proposed design configurations should minimize any impacts resulting from the project. The bank restoration portion of the proposed project should improve habitat conditions and more than offset any alteration to critical habitat from the dock structure.

C. Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." For the purposes of this analysis, the action area encompasses the area around the proposed project (the Willamette River between the Hawthorne and Morrison Bridges). Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries,

and land management activities are being (or have been) reviewed through separate section 7 consultation processes. The NMFS knows of no non-Federal actions that are reasonably certain to occur that may take listed salmonids within the action area.

Conclusion

NMFS has determined that, based on the available information, the City of Portland's Willamette River Eastbank Riverfront Bank Improvements and Fire Boat Dock Project is not likely to jeopardize the continued existence of LCR steelhead, LCR chinook salmon, UWR steelhead, UWR chinook salmon, SW/CR sea-run cutthroat trout, or SW/LCR coho salmon, nor will it result in the destruction or adverse modification of proposed critical habitat of the LCR steelhead, LCR chinook salmon, UWR steelhead, or UWR chinook salmon.

The NMFS reached this conclusion based on: 1) The fact that the use of grating and translucent panels on the dock and boathouse will not allow for increased effectiveness by predatory fish species, which could impair the biological requirement for increased migration survival by juvenile fish; 2) predatory bird prevention devices will be placed on the top of each pile; 3) all in-water work will be conducted during the Oregon Department of Fish and Wildlife's in-water work period, a time when the least amount of listed fish will be present in the project area; 4) the bank work will improve riparian areas by planting native vegetation and placing large woody debris; and 5) proposed critical habitat will be altered to the benefit of the listed anadromous fish species.

Incidental Take Statement

Sections 4(d) and 9 of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patters such as breeding, feeding, and sheltering. Harass is defined as actions that create the likelihood of injuring listed species to such an extent as to significantly alter normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement (ITS) specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts, and sets forth terms and conditions with which the action agency must comply in order to

implement the reasonable and prudent measures. An ITS does not apply to candidate or proposed species. While effects on SW/LCR coho salmon and SW/CR sea-run cutthroat trout were considered in this Biological Opinion, the reasonable and prudent measures and terms and conditions set forth in this ITS do not apply to SW/LCR coho salmon and SW/CR sea-run cutthroat trout. Should either of these species become listed in the future, this ITS would become effective for these species upon adoption of this conference opinion as a biological opinion.

The measures described below are non-discretionary. They must be implemented by the action agency so that they become binding conditions necessary in order for the exemption in Section 7(o)(2) to apply. The COE has a continuing duty to regulate the activity covered in this incidental take statement. If the administrative unit: (1) fails to adhere to the terms and conditions of the incidental take statement; and/or (2) fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse.

Amount or Extent of the Take

Notwithstanding the NMFS' conclusion that the subject proposed project is not expected to jeopardize the continued existence of LCR steelhead, LCR chinook salmon, UWR steelhead, UWR chinook salmon, SW/CR sea-run cutthroat trout, or SW/LCR coho salmon, there may be short-term impacts and NMFS anticipates that there could more than a negligible likelihood of incidental take of these species from some of the actions. The subject action, however, as described in the Biological Opinion, is expected to result in a low level of incidental take of listed and proposed species in the proposed action area. Effects of the action such as these are largely unquantifiable, but are not expected to be measurable as long-term effects on the species' habitat or population levels. Therefore, even though the NMFS expects an incidental take to occur as a result of the action covered by this Biological Opinion, the best scientific and commercial data available are not sufficient to enable NMFS to estimate a specific amount of incidental take to the listed and proposed species themselves. In instances such as these, the NMFS designates the expected level of take as "unquantifiable." Based on the information in the BA, the NMFS anticipates that an unquantifiable amount of incidental take could occur as a result of the action covered by this BO.

Reasonable and Prudent Measures

The NMFS believes that the following reasonable and prudent measures are necessary and appropriate to minimize the likelihood of incidental take of the species covered by this Opinion.

1. The COE shall require that the City of Portland conduct a monitoring program (further described under the Terms and Conditions section below) to assess the efficiency of the proposed measures to minimize the incidental take of listed salmon from increased predation associated with the new in water structures.

Terms and Conditions

To minimize the likelihood of incidental take of listed salmonid species which may result from proposed future actions, the COE shall implement the following terms and conditions. The individual projects covered by this Biological Opinion must also comply with the terms and conditions of all required state, Federal, and local permits.

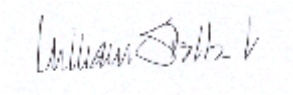
1. The COE will ensure that the City of Portland monitor the presence of the anadromous salmonids, their predators, and their habitat use, in and around the project area (as described in the BA), or will apply the funds (that would be spent on the monitoring program described in the BA) to a NMFS-approved comprehensive assessment which will include the same issues but on a larger scale. (Note: the City of Portland, Bureau of Environmental Services, is currently discussing the possibility of this broader assessment.)

Reinitiation of Consultation

Reinitiation of consultation is required if: (1) The amount or extent of taking specified in the incidental take statement, above, is exceeded; (2) the action is modified in a way that causes an effect on the listed species that was not previously considered in the BA and this biological opinion; (3) new information or project monitoring reveals effects of the action that may affect listed species in a way not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR § 402.16).

If you have any questions, please contact Michelle Day of my staff in the Oregon State Branch Office at (503) 231-6938.

Sincerely,



William Stelle, Jr.

Regional Administrator

References

Section 7(a)(2) of the ESA requires biological opinions to be based on "the best scientific and commercial data available." This section identifies the sources of data, information and references used in developing this Biological and Conference Opinion in addition to that submitted by the COE.

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